



Understanding your vapor intrusion test results

How are test results used?

Air samples, commonly referred to as sub-slab soil vapor samples, were collected beneath your home or building. A certified laboratory tested the samples. The test results show the amount of chemical contamination measured in the soil vapor. The Minnesota Pollution Control Agency (MPCA) uses these results to decide what needs to be done to protect the health of the building's occupants.

How much of a chemical is safe?

The MPCA, in cooperation with the Minnesota Department of Health (MDH), identified the amount of the chemical in indoor air that is considered safe for all people to breathe for a lifetime, including sensitive populations such as young children and pregnant women. These amounts are called Intrusion Screening Values (ISVs) and are based on scientific research and guidance from MDH and the U.S. Environmental Protection Agency (EPA). The ISVs represent an amount of a chemical in indoor air that would not harm the health of people living in the home.

Air sampling results are reported in micrograms of the chemical per cubic meter of air ($\mu\text{g}/\text{m}^3$). A microgram per cubic meter is a very small amount – it is similar to a few parts of the chemical amongst a billion parts of air.

The amount of a chemical in soil vapor beneath a building's foundation that is safe is based on research and guidance from EPA. An EPA study of buildings across the country showed the amount of chemicals in indoor air is often 100 to 1,000 times less than the amount that is present in soil vapor under the building. The building's basement floor and foundation walls reduce the movement of soil vapor into a building so that the amount that does enter is very small compared to the total amount (or volume) of air inside the house.

Why measure vapor below the structure?

Measuring chemicals in indoor air can be tricky because many things affect levels.

- Outside temperature
- Dry-cleaned clothing
- Some types of building materials
- Household chemicals and cleaners
- New carpeting
- Condition of foundation and floor
- Type and age of heating/cooling system



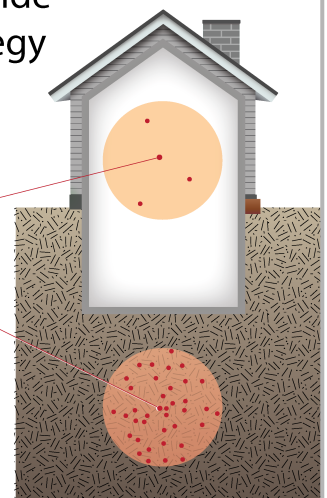
Things like carpet and cleaning products can off-gas chemicals — and heating/cooling systems can affect airflow. Testing below the basement avoids these complications.

Predicting vapor levels inside a structure: The 33X strategy

When chemical vapor pollution is present in soil under houses or buildings, research has shown that vapor levels inside the structure are much lower.

Chemical vapor levels in a house tend to be 100X to 1,000X less than what is present in the soil beneath.

To be safe, the MPCA and MDH assume vapor levels inside the structure would be **33X less** than what's measured in the soil beneath.





The MPCA takes a protective approach when deciding whether to address potential vapor intrusion. When the amount of a chemical in soil vapor beneath the home is greater than 33 times the amount that is safe for occupants to breathe indoors, additional action is needed. For example, if the amount of a chemical that is safe for air inside a home is $2 \mu\text{g}/\text{m}^3$, the MPCA will take action if that chemical is measured in a sub-slab sample at an amount that is more than $66 \mu\text{g}/\text{m}^3$. Actions may include installing a vapor mitigation system or additional sampling work.

Why not test indoor air?

The MPCA relies primarily on soil vapor testing results instead of testing indoor air to determine what, if any, action to take. The reason is that indoor air testing, by itself, does not prove that chemicals in the indoor air necessarily entered the building from an underground source of soil vapor.

Indoor air test results can be influenced by a variety of possible sources of chemicals that may be present inside a building. Many household or commercial products including paints, paint thinners, certain building materials, cleaning products, dry-cleaned clothing, cigarette smoke, aerosol sprays, and new carpeting or furniture release chemicals to indoor air. Indoor air quality can also be affected by outdoor (or ambient) air which may contain the same chemicals.

The amount of soil vapor that enters a building varies

The amount of soil vapor that actually enters a building can be influenced by many factors, including:

- Condition of the basement floor and foundation walls
- Outdoor temperature (a layer of frost traps soil vapor in the ground during the winter)
- Barometric pressure changes and wind
- Design and operation of heating and cooling systems
- Building construction (type of foundation and tightness/leakiness of the building)

During the colder months, heated air rises inside a building and escapes through the upper portions of the structure. This is called the "stack effect." This upward movement of air requires the lower portion of the structure to draw in air from the outside, including through the foundation walls and basement floor to some extent. Use of mechanical exhaust such as oven hoods, clothes dryers and ventilation fans can increase the stack effect.

Controlling vapor intrusion

If testing shows that vapor intrusion could be a concern, a common solution is to install a mitigation system. Vapor Mitigation systems work by creating a vacuum under the building which prevents soil vapors from entering the building. This type of system is also used throughout the country to prevent naturally occurring radon gas from entering buildings. The systems are inexpensive to operate and are a proven solution to vapor intrusion and radon problems.

For more information

Minnesota Pollution Control Agency — www.pca.state.mn.us/waste/vapor-intrusion

Minnesota Department of Health — www.health.state.mn.us/divs/eh/hazardous/topics/vaporintrusion.html